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SYSTEMS AND PARTS

EXPLOSION AND OTHER DETECTORS

Background

The proper working of an active safety system depends to a great extent on proper detection. Not only is the type of detector important, but also its location. An unfavourable location might not only result in so-called “false” alarms, but could also cause the detector to function improperly within the system, even thought the detector itself is perfectly OK. Think for example of the contamination of an optical detector by product deposits.
However, deposits on pressure detectors can also lead to a non-functioning system, especially with products that can cake due to moisture. Establishing the correct location is not always simple and is a job for specialists. Considerations include processes with CIP, excessive wear…

Product

Detectors generally can be divided into 2 groups: optical and pressure, each of which in turn can be subdivided depending on the application.

Group	Detection based on	Kind of detection	Applications	Protection principle
Optical	IR	Spark detection	FSGV(1), stopping of equipment such as rotary valves	Mainly preventive
	IR	Flame detection	FLASH, CB(2), extinguishing systems, FSGV	Curative
	UV	Flame detection	FLASH, CB, extinguishing systems(3), fire detection, FSGV	Curative
Pressure	p_{stat}	Static pressure detection	FLASH, CB, FSGV	Curative
	dp/dt (ROR)	Rate of pressure rise detection	FLASH, CB, FSGV	Curative

A number of these detection forms are often assembled in a single housing for reasons of back-up, better usability, etc. Examples include UV/IR, IR/p_{stat}/ROR…

StuvEx currently has the following detectors in its product range:

- PDS: static pressure detector
- PDP: combined detector P_{stat}, ROR, IR (flame)
- UV: flame detection
- ISD: spark detection

Type: PDP-02D

Type: PDP-02D

Type: PDS-03

Type: PDS-03

Functioning

The simplest detector is the PDS detector. This is a static pressure detector based on a membrane with a switch. The absence of electronics makes this detector very reliable.
Thanks to the large membrane, the detector is relatively insensitive to moderate product impact. This detector is also equipped with a mechanical memory.
All other detectors are electronic units that compare the signal of the sensors with their normal state settings. To avoid false alarms, the signal of the sensor is compared several times with the configured alarm and fault thresholds. If the sensor values are still within the alarm window after several samples, the alarm is triggered. Sample rate, sensitivity, etc. can be configured for the specific detector.
Detectors such as the PDP detector are also equipped with a memory(4), so that the triggering conditions can be verified after an alarm has been triggered.

System design

By using the right materials, all detectors can be used in the most demanding processes such as pharmacy, baby food and food in general. All parts that come in contact with the product are made of stainless steel or food approved plastics (in most cases with FDA approval). No glass is used, not even in the optical detectors.

Intended use

The detectors are always a component of a certified ATEX safety system, but they, of course, also have their own certificate as a component. Consequently, any application must be based on the instructions contained the ATEX certificate, the product specifications and the user manual.

Technical specifications

For more details on this product, we refer to the technical datasheet.

(1) Fast Shutting Gate Valve
(2) Chemical barrier
(3) Water, CO_2, steam…
(4) Even if the detector's power supply fails, the memory will remain intact (up to ± 10 years from production).

StuvEx retains the right to make changes without prior notice.

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IR Spark detector ISD01D

The ISD-01 makes it possible to detect sparks and hot points(1). It is intended to be used in industrial fire and explosion protection systems. The ISD-01 is very sensitive in the IR spectrum but also has a certain sensitivity in the visible light spectrum. Thus, it may only be installed in locations isolated from visible light.
The detector is equipped standard with an input to test the detection cell. When this input is short-circuited, an internal IR-LED is triggered, which allows the functioning of the IR sensitive element to be tested.

IR Spark detector ISD01D

Properties	
Electrical	
Power supply	12 up to 24 V DC
Consumption	40 mA @ 24 V DC
Temperature	
Ambient temperature	0°C - +80°C
Storage temperature	-20°C - +80°C
Mechanical	
Viewing angle	95°
Dimensions	
Housing	125 h x 80 w x 55 d
Measuring probe	Ø 16 x 40 mm
Material	
Housing	Aluminium
Measuring probe	SS304
Delay	
Response time	≤ 2.2 ms
Signalling	
Visual: Malfunction	Green LED (lights when no malfunction is present)
Visual: Alarm	Red LED
Remote signalling	RSS & NO/NC contact
Other	
Highest sensitivity	IR Band: 780-1100 nm
Protection degree	IP65
ATEX marking CE Ex	II 1/2D 85°C IP65
Optional	Alarm counter

(1) Hot particle not (yet) emitting light.

UV Flame detector ODS02D

UV Flame detector ODS02D

The optical flame detector ODS02D has its highest sensitivity in the UV spectrum and thus is insensitive to visible light and to most artificial light sources. The reaction time can be adjusted via DIP switches so that false alarms caused by parasitic radiation can be avoided.

Sensitive to:

- flames
- electrical arcs (e.g. from welding equipment)
- halogen lamps without safety glass
- all radiation sources between λ 185 and 260 nm

Insensitive to:

- (in)direct solar rays
- artificial light such as fluorescent lamps
- halogen lamps with safety glass
- radiant heat from objects

The ODS02D also detects contamination of the viewing window: immediately generating a fault signal. The detector can be used to detect of all sorts of open fire.

Properties	
Electrical	
Power supply	12 up to 24 V DC
Consumption	40 mA @ 24 V DC
Temperature	
Ambient temperature	0°C - +70°C
Storage temperature	-20°C - +80°C
Mechanical	
Viewing angle	>80° horizontal 80° vertical
Dimensions	140 h x 90 w x 70 d mm
Material	Aluminium
Delay	
Response time	< 50 ms
Signalling	
Visual: Malfunction	Yellow LED blinking
Visual: Malfunction (present)	No or yellow LED
Visual: Alarm	Red LED
Signalling at distance	RSS & NO contact
Other	
Highest sensitivity	UV Band: 185-260 nm
Protection degree	IP65
ATEX marking CE Ex	II 1/2D 85°C IP65
Conformity	EN54-10 Class 1

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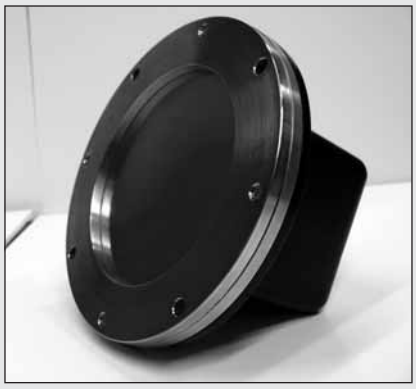
PDS pressure detector

PDS pressure detectors are mainly used as part of a Flash explosion suppression system.
They respond to an increase in pressure and will trigger when their normal static setting is exceeded. This is set at the factory and cannot be changed.
The detector is equipped with a mechanical memory: in the presence of overpressure, the convex membrane flips to the other side and will stay in that position (except in processes under vacuum).

The detector is available in several versions(1):

- PDS02-xx-NC: “normally closed”: circuit with a 1k2 resistance parallel to the alarm contact. No open wire resistance (end of line) resistor included.
- PDS02-xx-NO: “normally open”: circuit with a 680 R resistance in series with the alarm contact and with a 3k9 open wire resistance (end of line).
- PDS03-xx: suitable for RSS-based control units.



PDS pressure detector

Properties	
Types1	PDS02-xx-NO, PDS02-xx-NC, PDS03-xx
Settings @ -20°C up to +90°C	50-70-100 mbar (fixed), others on request
Tolerance	10%
Maximum underpressure	Absolute vacuum
Maximum explosion pressure	10 bar
Process temperature	-20°C up to +90°C, other temperature ranges on request
Contact ratings	Max. +24 V DC at 20 mA
Parts in contact with the product	SS304
Protection degree	IP65
Marking CE Ex	II 1/2D 85°C IP65
Dimensions:	
Required mounting hole for the mounting flange:	Ø 106 mm
Diameter of the detector flange:	Ø 153 mm
Height of the detector:	92 mm

Options	
Marking CE Ex	II 1/2 G/D EExed IICT6 (85°)

(1) xx = 50-70-100 (standard), other values on request

PDP detector

PDP detector

PDP detectors are mainly used as part of a Flash explosion suppression system. The detector has three detection modes: static, pressure rise and IR. Each mode has its own setting. The detector's alarm contact is triggered when one of the mode settings is exceeded.
The settings can be configured on site.
In addition, the detector also has a memory of ±16 seconds. In the case of triggering, the data from the pressure and IR sensors is automatically recorded 8s before and 8s after the alarm. This alarm can only be erased by manual intervention, even if the detector loses power.
The accompanying controller uses LEDs to indicate the detector's state: OK/malfunction, triggered/not triggered, triggered on mode static/dynamic/IR, memory triggered.

The detector is available in several versions:

- PDP02: “normally open”: circuit with a resistance of 680 R in series with the alarm contact and with a 3k9 broken wire resistance (end of line).
- PDP03: suitable for RSS-based control units.

Properties	
Types	PDP02 & PDP03
Settings:	
Static:	25 to 1000 mbar
Dynamic (ROR):	0.5 to 5 bar/s
IR:	0.5 to 3 V (±100 candelas/V @ 1m)
Maximum underpressure	Absolute vacuum
Maximum explosion pressure	7 bar
Process temperature	-10°C - +90°C
Power supply	+24 V DC/20 mA
Contact ratings	Max. +24 V DC at 20 mA
Parts in contact with the product	SS304
Protection degree	IP65
Marking CE Ex	II 1/2D 85°C IP65
Dimensions	
Necessary hole for the mounting flange	Ø 106 mm
Diameter & height of the detector head:	Ø 155 x 65 mm
Controller box	175 h x 80 w x 60 d mm

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